

Notes on a little known ecologically displaced blue, *Agriades pyrenaicus ergane* Higgins (Lycaenidae)

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Abstract. The distribution, ecological relationships, and early stage features of the recently described blue, *Agriades pyrenaicus ergane*, are described. This species is widely disjunct, occurring in the high mountains of northern Spain, Yugoslavia (?), Caucasus, and in a specialized habitat in lowland Ukraine.

Distribution

The recent discovery and description of *Agriades pyrenaicus ergane* in the southeast USSR was surprising for two reasons: this is a well studied and known region and the species represents a wide disjunction in both distance and ecological conditions from the alpine regions of the mountains of northern Spain and Caucasus, while in the Ukr. SSR their habitats are found at an elevation of 200M. The subspecies was originally described from two adult specimens labelled "Voronezh" (Higgins, 1981). These were collected by O. V. Zuravlev near the village of Divnogorje (fig. 1) in June 1980 according to information given in Korshunov (1984), and a series of topotypes given to the Zoological Museum, Biological Institute, Siberian department of the Academy of Science. Later this subspecies was found in the Ukraine by Nekrutenko and Pljushtch (1983) near the village of Efremovka (fig. 1). The latter is its only known locality in the Ukraine.

Adult Behavior

In 1984 and 1985, I made extensive observations of the ecology of the species near Efremovka. The adult insects flew in the latter part of May. The males emerged first on May 9. The last males were observed May 27. The earliest females emerged on May 17 and were last observed on June 1. The mass flight of both sexes was seen between May 19 and 24.

Although common where they are found, the butterflies are extremely localized and specialized. They are concentrated on the steep southern exposure chalk slopes forming the banks of the river Volchja here, as shown in the habitat view in fig. 2. The butterflies do not fly far from their preferred sites and have never been observed further than 50M from their biotopes. Adult preference are weakly eroded depressions, without shrubs or trees, and with a gradient of 30 to 50. This preference

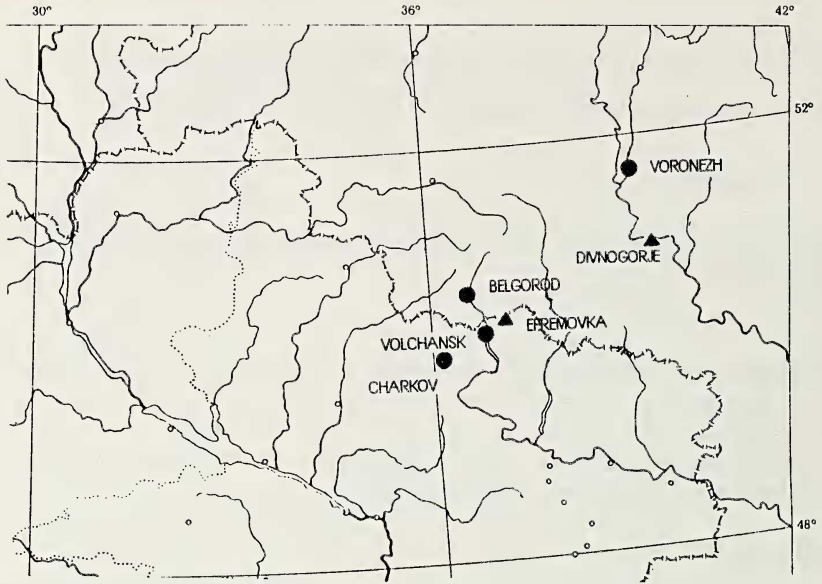
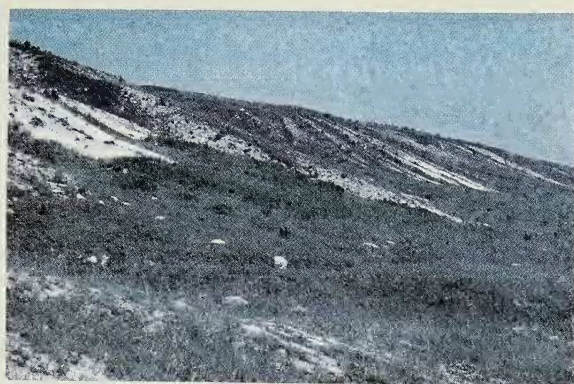


Fig. 1. Map of South East USSR showing cities and two localities of *A. pyrenaicus ergane*.

appears similar to that described by Thomas (1983) for *Lysandra bellargus* in the south of England. Thomas determined that butterfly siting was due to higher temperatures in the depressions, which provided a microclimate more favorable to early stages as well. Fig. 3 shows concentrations of the butterfly hostplant, *Androsace kosopoljanskii* Ovcz. (Primulaceae), which grows in high density in the depressions. Although the plant is occasionally a dominant in its specialized habitat, it is restricted to central Russian chalk hills of the tertiary and is regarded as an endangered plant species, see Zaviruha, Andrienko, and Protopopova (1983: p.35-36). By the same reasoning, *Agriades pyrenaicus ergane* should be regarded as an endangered butterfly. It is both a relict and highly localized.

The development of all stages of the butterfly are intimately associated with its hostplant. The key feature in the emergence of the adults is the flowering time of *Androsace*. Adult butterflies usually nectar on the hostplant and spend some time perching upon it. The females may oviposit on the inner surface of the sepals, among the flower buds, or the inner part of the calyx at the base of the sepals. They also oviposit on the thin stems or in the leaf axils. Before oviposition, the female thoroughly probes with her abdomen, but only single eggs are deposited. Eggs are deposited in a very brief time period (15-60 secs.). Usually the number of females is so large to suitable oviposition substrate that several eggs can be found on one site. Adults also nectar on *Salvia nutans* L., *Linum flavum* L., and other plants which are in flower at the proper time.



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Fig. 2. A chalk uncovering of steep slopes of the south exposition of river Volchja near village Efremovka, Volchanski district, Harkov region, Ukr. SSR—the biotope of the *Agriades pyrenaicus ergane*.

Fig. 3. The flowering of *Androsace koso-poljanskii* Ovc. on the chalk slopes.

Fig. 4. The copulating pair of *Agriades pyrenaicus ergane* on its host plant.

Fig. 5. A male *Agriades pyrenaicus ergane* which copulating with fresh but killed female which was being sucked out by a spider. Another male was evidently flirting with this strange pair.

Fig. 6. The female of *A. pyrenaicus ergane* on the flowers of *Salvia nutans* L.

Fig. 7. The caterpillars of *A. pyrenaicus ergane* on *Androsace koso-poljanskii*.

Fig. 8. As 6, different view.

Strong winds and cloud cover do not adversely affect adult flight. They tend to fly within 6 to 15cm of the ground, below serious wind effects. They often perch on stems, chalk stone, and paths. When on the ground they generally rest sideways to the chalk where they are cryptically concealed on the light surfaces.

Both sexes emerge in the daytime, mostly between 1000 and 1410. On a sunny morning adults begin flying at 0730, with males out in mass by 0745. The females follow reaching peak density at 0800. The earliest copulating pair was observed at 0910. The mass of copulation was observed between 1000 and 1500. With the high population densities at the site, as soon as a female emerged, she was seen surrounded by two or three males. Copulation usually started before females would spread their wings.

Prior to their first flight in the morning, adults would open their wings, at a obtuse angle, and turn towards the sun. This apparent thermoregulatory movement lasted several minutes. They would then usually start nectaring at once.

An unusual event was witnessed and recorded (fig. 5) on May 19, 1984. The female of a copulating pair was killed and being fed upon by a spider *Xysticus cristatus* (Cl.) (det: V. E. Gurjanova). The male continued pumping spermatophore while a second male was attempting to interfere, both oblivious to the situation and danger to themselves. Another spider, *Thanatus* sp., was involved in predation of the blues.

Flight time continued until 1800-1900. The butterflies tended to rest at night at the tops of various low plants, especially showing attraction to the flower stalks of *Salvia nutans* and other flowers with pink or violet colors (fig. 6). The usually grouped in clusters of 3-4, but clusters of 7-8 were seen. At sunrise, the butterflies placed themselves so their folded wings, underside exposed, were perpendicular to the sun.

Early Stages

In the field the egg stage lasts 10-15 days, with a 50% emergence. The remainder collapsed, indicating infertility. The neonate larvae fed exclusively on flower and bud tissue. They enter diapause at the end of this instar, while still very small. They move beneath lumps of chalk on or under the soil surface. At this point they effectively disappear from observation.

The following spring diapause breaks with the sprouting of new vegetative growth of the hostplant in early April following snowmelt. Feeding is restricted to young leaves and terminal buds. By the third week in April mature larvae can be found among second and third instars, with larva densities very high. One *Androsace* rosette had 25 larvae (a surface area of about 2 dm²). A square meter quadrat carried more than 100 larvae. The average density was 8.3 per rosette, or about 6 larvae per dm². The larvae, shown in situ in figs. 7 and 8, are cryptically colored and difficult to see among the foliage and blossoms of

Androsace. In the earlier instars they are darker, and usually confine themselves to the top "cone" of the bud where they gnaw through to feed on the internal bud contents. At this time only part of the posterior portion protrudes and is very difficult to detect. The last instar is lighter, and these caterpillars live in a more open situation (figs. 7, 8), usually in groups of three or four. When disturbed they drop to the ground immediately where they remain tightly rolled up for several minutes. The larvae are quite sedentary until time to pupate. They then vigorously move about the hostplant and ground. The first pupation was observed on April 25 in 1985 and was complete on May 1. Pupation from prepupa to eclosion is about 15 days.

Egg: Echinoid, 0.5-0.6mm, grey, with clear micropyle dorsally. Sculpturing of two types, with large, smoother cells dorsally, and smaller more prominently ridged cells laterally. Larva escapes by cutting a hole in the lateral part of the egg.

Larva: (figs. 7, 8). Fourth instar 11-13mm, typical omnisciform. Head completely retractile, small, black. Densely covered with secondary setae. Background color bright green with prominent stripes. Dorsally stripes black with lilac shading with dumb-bell shaped sectors in the middle of each segment, and framed with white. Subdorsal stripes short, thick dark gray extending antero-dorsal to postero-ventral on each segment. Subspiracular stripe bicolor; the upper part lilac, the lower white. The pigmentation of the stripes appears epidermal, whereas the background green appears hypodermal. Spiracles round, lined inside in black. Setae on the dorsal margin of spiracles longer, 5-6 times as long as the spiracle diameter.

Pupa: (fig. 9). 9-10mm, strongly sclerotized. Venation of the forewing showing on the integument, this wing cover section slightly raised above the remaining surface. Anterio-ventral part wrinkled. The head protruding with respect to other body parts., antennae, proboscis and legs finely differentiated. Postgenae dark, prominent. Labrum large, heart shaped. Proboscis reaches middle of forewing covers. Pro and mesothoracic legs short, no tarsi visible. Mesothorax strongly protuberant. Eight to tenth abdominal segments ventrally flexed. Cremaster not expressed.

Conservation status Although *Agriades pyrenaicus ergane* is a very abundant butterfly where it occurs, the habitat type is uncommon. It is known from only the two localities in the region of tertiary chalk hills, where its larval hostplant is recognized as a species of concern by its listing in the Red Book of Plants of the USSR. A regular program of monitoring these populations should be instituted formally, and an investigation of ecological requirements started. It is likely similar habitat factors to those regulating populations of *Lysandra bellargus*, as found by Thomas (1983), such as grazing management to keep sward height reduced, may operate here. The large disjunction of this subspecies from its vicariant alpine european and caucasian conspecifics is noteworthy in the argument to study and preserve these unique insects.

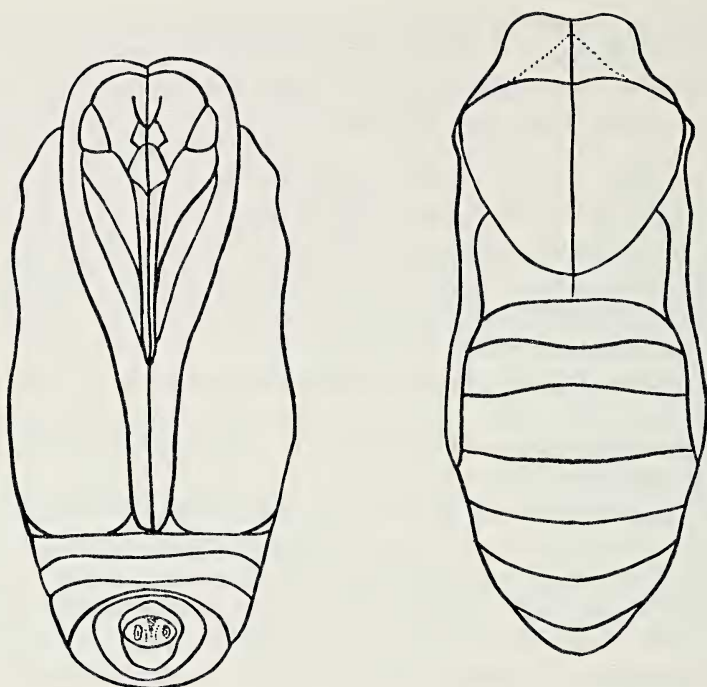


Fig. 9 The pupa of *Agriades pyrenaicus ergane*.

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